

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
29 September 2005 (29.09.2005)

PCT

(10) International Publication Number
WO 2005/091216 A3

(51) International Patent Classification:

G06T 5/00 (2006.01) G06T 11/00 (2006.01)

(21) International Application Number:

PCT/IB2005/050824

(22) International Filing Date: 7 March 2005 (07.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

04101102.4 17 March 2004 (17.03.2004) EP

(71) Applicant (for DE only): **PHILIPS INTELLECTUAL PROPERTY & STANDARDS GMBH** [DE/DE]; Stein-damm 94, 20099 Hamburg (DE).

(71) Applicant (for all designated States except DE, US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KÖHLER, Thomas**

[DE/DE]; c/o Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE). **BONTUS, Claas** [DE/DE]; c/o Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE).

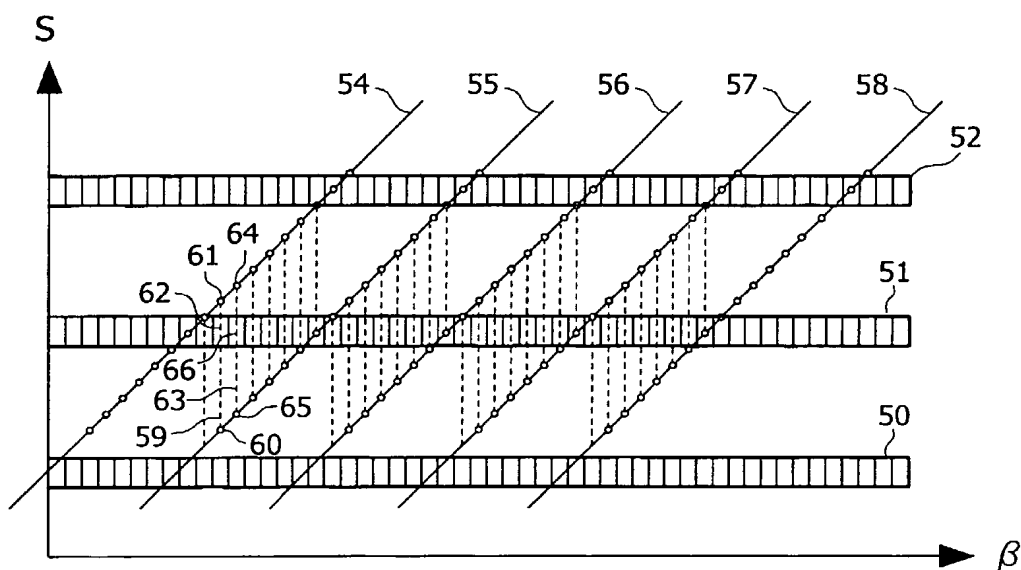
(74) Agent: **VOLMER, Georg**; Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: MULTIPLE FOCUS ACQUISITION



(57) Abstract: Image quality is an important feature for CT scanning, in particular for helical cone-beam CT scanning. By using projection data acquired at two different positions of the focal spot of the radiation beam and rebinning that projection data from a first geometry to a second geometry the two sub-sets of projection data are combined to one rebinned projection data set, thereby improving the radial resolution of the data set. Advantageously, according to an aspect of the present invention, a further rebinning may be performed, from the second geometry back to the first geometry, therefore resulting in a projection data set in the initial geometry with a higher radial resolution.

WO 2005/091216 A3



Published:

— with international search report

(88) Date of publication of the international search report:

18 May 2006

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

 Int'l Application No
 PCT/IB2005/050824

 A. CLASSIFICATION OF SUBJECT MATTER
 G06T5/00 G06T11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

 Minimum documentation searched (classification system followed by classification symbols)
 G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 411 670 B1 (BESSON-GUY-M) 25 June 2002 (2002-06-25)	1, 9, 11, 13
Y	abstract column 1, line 49 - column 2, line 12 column 7, line 52 - column 8, line 28 -----	2
Y	EP 0 467 532 A (GENERAL ELECTRIC COMPANY) 22 January 1992 (1992-01-22) abstract column 1, lines 33-45 column 2, line 38 - column 3, line 55 ----- -/-	2

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

16 February 2006

Date of mailing of the international search report

01/03/2006

Name and mailing address of the ISA

 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Gao, M

INTERNATIONAL SEARCH REPORT

 Int onal Application No
 PCT/IB2005/050824

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>BESSON, G.M.: "CT image reconstruction from fan-parallel projection data" NUCLEAR SCIENCE SYMPOSIUM, 1998. CONFERENCE RECORD, 'Online! vol. 3, 1998, pages 1644-1648, XP002368068 Retrieved from the Internet: URL:http://ieeexplore.ieee.org/xpl/abs_fre.jsp?arNumber=773856> 'retrieved on 2006-02-14! abstract section I. "Introduction"</p>	1,9,11, 13
A	<p>JIANG HSIEH: "Optimization of detector geometry for aliasing artifact reduction in the third-generation CT" PROCEEDINGS OF THE SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING SPIE-INT. SOC. OPT. ENG USA, vol. 3032, 1997, pages 204-212, XP002368069 ISSN: 0277-786X abstract section 1. "Introduction" figure 2</p>	1-14
A	<p>EP 0 543 626 A (GENERAL ELECTRIC COMPANY) 26 May 1993 (1993-05-26) abstract page 3, lines 9-34 page 5, lines 37-45</p>	1-14
P,X	<p>US 2004/081279 A1 (BRUNETT CARL J) 29 April 2004 (2004-04-29) paragraphs '0045! - '0063! figures 4-7</p>	1,2,9, 11,13
A	<p>JIANG HSIEH ET AL: "Reconstruction technique for focal spot wobbling" PROCEEDINGS OF SPIE-MEDICAL IMAGING VI: IMAGE PROCESSING, 'Online! vol. 1652, June 1992 (1992-06), pages 175-182, XP002368070 Retrieved from the Internet: URL:http://spiedl.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=PSISDG00165200001000175000001&idtype=cvips&gifs=yes> 'retrieved on 2006-02-14! section "A processing technique"</p>	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB2005/050824

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6411670	B1	25-06-2002	NONE	
EP 0467532	A	22-01-1992	CA 2042230 A1	21-12-1991
			DE 69114932 D1	11-01-1996
			DE 69114932 T2	25-07-1996
			IL 98397 A	31-10-1995
			JP 2758515 B2	28-05-1998
			JP 4231940 A	20-08-1992
			US 5173852 A	22-12-1992
EP 0543626	A	26-05-1993	DE 69213167 D1	02-10-1996
			DE 69213167 T2	27-03-1997
			JP 2511622 B2	03-07-1996
			JP 5208007 A	20-08-1993
			US 5361291 A	01-11-1994
US 2004081279	A1	29-04-2004	AU 2003264814 A1	13-05-2004
			CN 1705456 A	07-12-2005
			EP 1558143 A1	03-08-2005
			WO 2004037089 A1	06-05-2004